

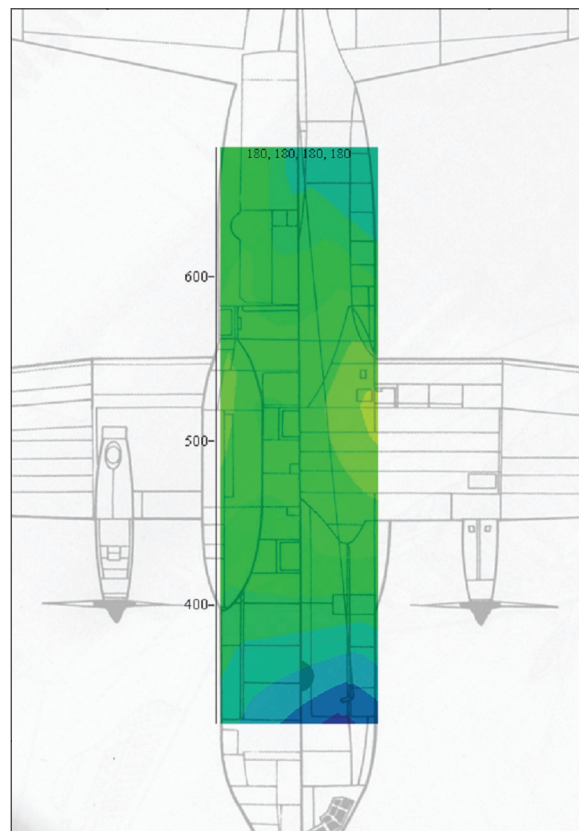


# Air Force Research Laboratory|AFRL

*Science and Technology for Tomorrow's Air and Space Force*

## **Success Story**

### **ACTIVE SYNCHROPHASER LOWERS C-130 INTERIOR NOISE LEVELS**



The Human Effectiveness Directorate's Crew System Interface Division completed flight tests and analyses of the C-130 Active Synchrophaser System, which showed reduced interior noise levels by as much as 22 decibels (dB). Now for the first time, the directorate demonstrated reduced noise levels in four-engine propeller aircraft using a propeller synchronization technique.



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## **Accomplishment**

Using four-engine C-130s, directorate engineers demonstrated that noise from one propeller could cancel out the noise from another propeller when properly synchronized. The decrease in sound is significant in reducing pilot and crew fatigue, in mitigating exposure to prolonged noise and elevated noise levels, and in retaining the ability to hear.

## **Background**

The propellers of C-130 aircraft emit a low, resonating tone, precipitating the need to reduce the acoustic signature. The directorate's bioacoustics expertise was key in that effort.

The directorate conducted in-flight and ground noise measurements of the advanced synchrophaser control unit to determine if controlling the propeller phase angles of C-130 type aircraft could reduce the noise. During the flight test, aircrew noted test points where cockpit noise levels were so low, they had to remove their hearing protection to be assured that the engines were operating. In fact, the directorate identified a 22 dB reduction in cockpit noise levels during that particular phase of the testing.

The directorate demonstrated a basic synchrophaser system for twin-engine aircraft in 1992, based on a manually tuned system with no phase control. Two years later, the directorate produced the first digital synchrophaser that controlled the propeller phase by regulating the fuel flow to obtain a 10-15 dB interior noise reduction in an OV-10 twin-engine propeller aircraft.

However, the C-130 Active Synchrophaser System uses acoustic feedback from microphones specifically arranged and mounted to the fuselage or by a personal computer-based controller to find the correct phase for reducing noise levels. The C-130 Active Synchrophaser System demonstrated that significant noise-level reductions can be accomplished for turboprop aircraft without affecting the basic aircraft performance.

## **Additional information**

To receive more information about this or other activities in the Air Force Research Laboratory, contact TECH CONNECT, AFRL/XPTC, (800) 203-6451 and you will be directed to the appropriate laboratory expert. (03-HE-07)